

APPROVED	O. G. FIG.
BY	CLASS SUBCLASS
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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

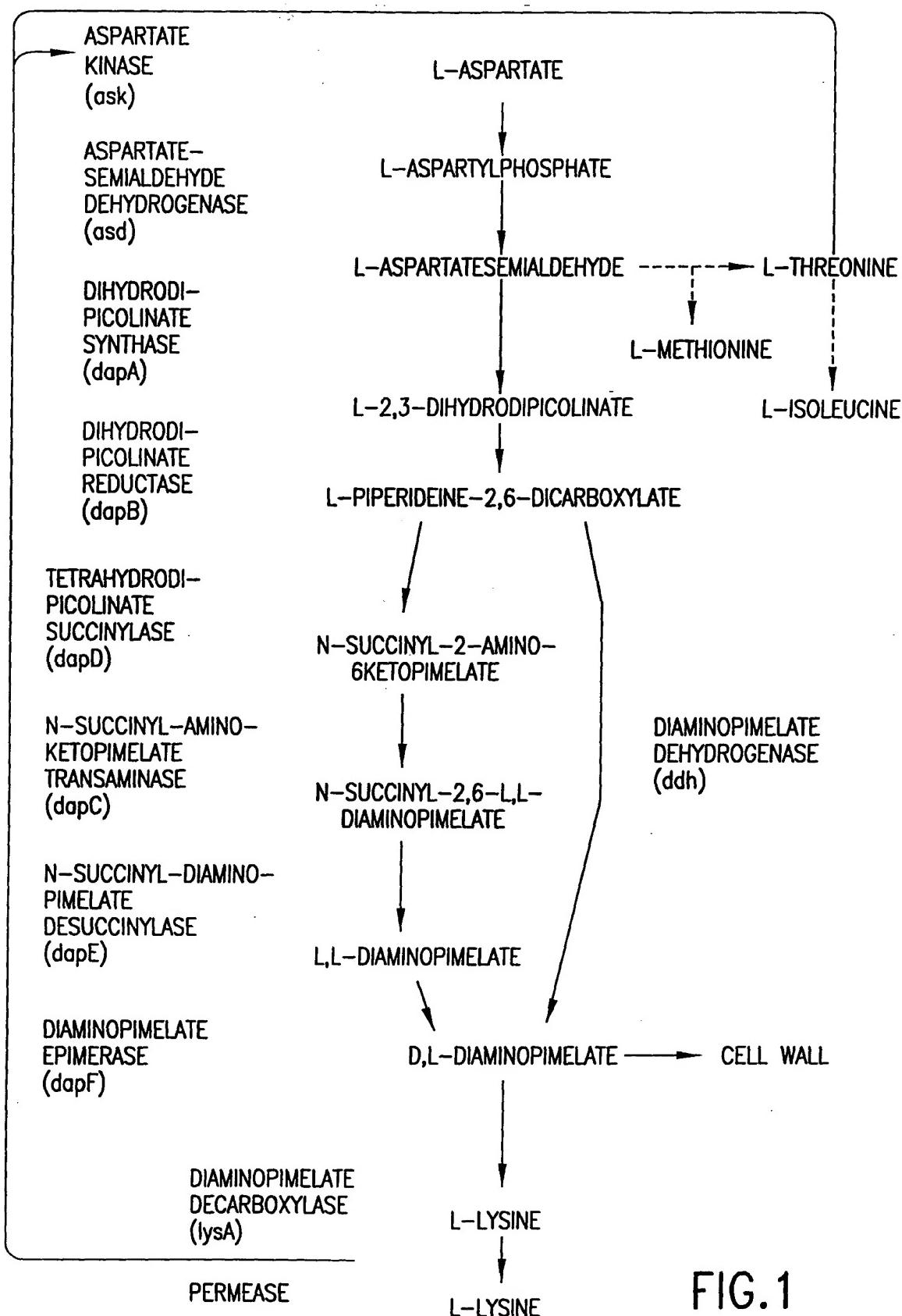


FIG.1

APPROVED BY	O.G. FIG.
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Nucleotide sequence of ATCC21529 ask (SEQ ID NO:1)

```

1 GTGGCCCTGG TCGTACAGAA ATATGGCGGT TCCTCGCTTG AGAGTGCAGA
51 ACGCATTAGA AACGTCGCTG AACGGATCGT TGCCACCAAG AAGGCTGGAA
101 ATGATGTCGT GGTTGTCGT CTCGCAATGG GAGACACCAAC GGATGAACCTT
151 CTAGAACTTG CAGCGGCAGT GAATCCCAGT CCGCCAGCTC GTGAAATGGA
201 TATGCTCCTG ACTGCTGGTG AGCGTATTTT TAACGCTCTC GTCGCCATGG
251 CTATTGAGTC CCTTGGCGCA GAAGCTCAAT CTTTCACTGG CTCTCAGGCT
301 GGTGTGCTCA CCACCGAGCG CCACGGAAAC GCACGCATTG TTGACGTCAC
351 ACCGGGTCGT GTGCGTGAAG CACTCGATGA GGGCAAGATC TGCAATTGTTG
401 CTGGTTTTCA GGGTGTAAAT AAAGAAAACCC GCGATGTCAC CACGTTGGGT
451 CGTGGTGGTT CTGACACCAAC TGCAAGTTGCG TTGGCAGCTG CTTTGAACGC
501 TGATGTTGTT GAGATTTACT CGGACGTTGA CGGTGTGTAT ACCGCTGACC
551 CGCGCATCGT TCCTTAATGCA CAGAAGCTGG AAAAGCTAG CTTCGAAGAA
601 ATGCTGGAAC TTGCTGCTGT TGGCTCCAAG ATTGTTGGTGC TGCGCAGTGT
651 TGAATACGCT CGTGCATTCA ATGTGCCACT TCGCGTACGC TCGTCTTATA
701 GTAATGATCC CGGCACTTG ATTGCCGGCT CTATGGAGGA TATTCTGTG
751 GAAGAAGCAG TCCTTACCGG TGTCGCAACC GACAAGTCCG AAGCCAAAGT
801 AACCGTTCTG GGTATTTCCG ATAAGCCAGG CGAGGCTGCC AAGGTTTCC
851 GTGCGTTGGC TGATGCAAGAA ATCAACATTG ACATGGTTCT GCAGAACgtc
901 tcctctgtgg AAGACGGCAC CACCGACATC ACGTTCACCT GCCCTCGCGC
951 TGACGGACGC CGTGCATGG AGATCTTGAA GAAGCTTCAG GTTCAGGGCA
1001 ACTGGACCAA TGTGCTTAC GACGACCAGG TCGGCAAAGT CTCCCTCGTG
1051 GGTGCTGGCA TGAAGTCTCA CCCAGGTGTT ACCGCAGAGT TCATGGAAGC
1101 TCTGCGCGAT GTCAACGTGA ACATCGAATT GATTCCATC TCTGAGATCC
1151 GCATTTCCGT GCTGATCCGT GAAGATGATC TGGATGCTGC TGCACGTGCA
1201 TTGCATGAGC AGTCCAGCT GGGCGGCAGA GACGAAGCCG TCGTTTATGC
1251 AGGCACCGGA CGCTAA

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FIG. 2

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Amino Acid Sequence of ATTC21529 ask (SEQ ID NO:2)

GTGGCCCTGGTCGTACAGAAATATGGCGGTTCTCGCTTGAGAGTGCAGAACGCATTAGA
 1 -----+-----+-----+-----+-----+-----+ 60
 M A L V V Q K Y G G S S L E S A E R I R
 AACGTCGCTGAACGGATCGTGCACCAAGAAGGCTGGAAATGATGTCGTGGTTGCTGC
 61 -----+-----+-----+-----+-----+-----+ 120
 N V A E R I V A T K K A G N D V V V V C
 TCCGCAATGGGAGACACCACGGATGAACCTCTAGAACATTGCAGCGGAGTGAATCCCGTT
 121 -----+-----+-----+-----+-----+-----+ 180
 S A M G D T T D E L L E L A A A V N P V
 CCGCCAGCTCGTGAATGGATATGCTCCTGACTGCTGGTAGCGTATTCTAACGCTCTC
 181 -----+-----+-----+-----+-----+-----+ 240
 P P A R E M D M L L T A G E R I S N A L
 GTCGCCATGGCTATTGAGTCCCTGGCGCAGAAGCTCAATCTTCACTGGCTCTCAGGCT
 241 -----+-----+-----+-----+-----+-----+ 300
 V A M A I E S L G A E A Q S F T G S Q A
 GGTGTGCTACCCACCGAGCGCCACGGAAACGCACGCATTGTTGACGTACACCGGGTCGT
 301 -----+-----+-----+-----+-----+-----+ 360
 G V L T T E R H G N A R I V D V T P G R
 GTGCGTGAAGCACTCGATGAGGGCAAGATCTGCATTGTTGCTGGTTTCAGGGTGTAAAT
 361 -----+-----+-----+-----+-----+-----+ 420
 V R E A L D E G K I C I V A G F Q G V N
 AAAGAAACCCGCGATGTACCGACGTTGGTCGTGGTGGTCTGACACCACTGCAGTTGCG
 421 -----+-----+-----+-----+-----+-----+ 480
 K E T R D V T T L G R G G S D T T A V A
 TTGGCAGCTGCTTGAACGCTGATGTGTGAGATTACTCGGACGTTGACGGTGTGTAT
 481 -----+-----+-----+-----+-----+-----+ 540
 L A A A L N A D V C E I Y S D V D G V Y
 ACCGCTGACCCCGCGCATCGTCTTAATGCACAGAAGCTGGAAAAGCTCAGCTTCGAAGAA
 541 -----+-----+-----+-----+-----+-----+ 600
 T A D P R I V P N A Q K L E K L S F E E
 ATGCTGGAACTTGTGCTGTTGGCTCAAGATTGGTGCTGCGCAGTGTGAATACGCT
 601 -----+-----+-----+-----+-----+-----+ 660
 M L E L A A V G S K I L V L R S V E Y A

FIG.3A

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CGTGCATTCAATGTGCCACTTCGCGTACGCTCGTCTTAGTAATGATCCCGGACTTTG
 661 -----+-----+-----+-----+-----+-----+ 720
 R A F N V P L R V R S S Y S N D P G T L
 ATTGCCGGCTCTATGGAGGATATTCCGTGGAAAGAAGCAGTCCTACCGGTGTCGCAACC
 721 -----+-----+-----+-----+-----+-----+ 780
 I A G S M E D I P V E E A V L T G V A T
 GACAAGTCCGAAGCCAAGTAACCGTTCTGGGTATTCGATAAGCCAGGCGAGGCTGCC
 781 -----+-----+-----+-----+-----+-----+-----+ 840
 D K S E A K V T V L G I S D K P G E A A
 AAGGTTTCCGTGCGTGGCTGATGCAGAAATCAACATTGACATGGTTCTGCAGAACgtc
 841 -----+-----+-----+-----+-----+-----+-----+ 900
 K V F R A L A D A E I N I D M V L Q N V
 tcctctgtGGAAGACGGCACCCGACATCACGTTCACCTGCCCTCGCGCTGACGGACGC
 901 -----+-----+-----+-----+-----+-----+-----+ 960
 S S V E D G T T D I T F T C P R A D G R
 CGTGCATGGAGATCTTGAAGAAGCTTCAGGTTCAAGGCAACTGGACCAATGTGCTTAC
 961 -----+-----+-----+-----+-----+-----+-----+ 1020
 R A M E I L K K L Q V Q G N W T N V L Y
 GACGACCAGGTGGCAAAGTCTCCCTCGTGGGTGCTGGCATGAAGTCTCACCCAGGTGTT
 1021 -----+-----+-----+-----+-----+-----+-----+ 1080
 D D Q V G K V S L V G A G M K S H P G V
 ACCGCAGAGTTCATGGAAGCTCTGCGCATGTCACGTGAACATCGAATTGATTCCATC
 1081 -----+-----+-----+-----+-----+-----+-----+ 1140
 T A E F M E A L R D V N V N I E L I S I
 TCTGAGATCCGATTTCCGTGCTGATCCGTGAAGATGATCTGGATGCTGCTGCACGTGCA
 1141 -----+-----+-----+-----+-----+-----+-----+ 1200
 S E I R I S V L I R E D D L D A A A R A
 TTGCATGAGCAGTTCCAGCTGGCGCGAAGACGAAGCCGTCGTTATGCAGGCACCGGA
 1201 -----+-----+-----+-----+-----+-----+-----+ 1260
 L H E Q F Q L G G E D E A V V Y A G T G
 CGCTAA
 1261 ----- 1266
 R *

FIG.3B

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 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of ATCC21529 asd (SEQ ID NO:3)

```

1  ATGACCACCA TCGCAGTTGT TGGTGCAACC GGCCAGGTCG GCCAGGTTAT
51  GCGCACCTTT TTGGAAGAGC GCAATTCCC AGCTGACACT GTTCGTTTCT
101 TTGCTTCCCC GCGTTCCGCA GGCCGTAAGA TTGAATTCCG TGGCACGGAA
151 ATCGAGGTAG AAGACATTAC TCAGGCAACC GAGGAGTCCC TCAAGGGCAT
201 CGACGTTGCG TTGTTCTCTG CTGGAGGCAC CGCTTCCAAG CAGTACGCTC
251 CACTGTTGC TGCTGCAGGC GCGACTGTTG TGGATAACTC TTCTGCTTGG
301 CGCAAGGACG ACGAGGTTCC ACTAATCGTC TCTGAGGTGA ACCCTTCCGA
351 CAAGGATTCC CTGGTCAAGG GCATTATTGC GAATCTAAC TGCAACCACCA
401 TGGCTGCAAT GCCAGTGCTG AAGCCACTGC ACGATGCCGC TGGCTTGTAA
451 AAGCTTCACG TTTCCTCTTA CCAGGCTGTT TCCGGTTCTG GTCTTGCAGG
501 TGTGGAAACC TTGGCAAAGC AGGTTGCTGC AGTTGGCGAC CACAACGTTG
551 AGTTCGTCCA TGATGGACAG GCTGCTGACG CAGGCGATGT CGGACCTTAC
601 GTTTCCCCAA TCGCTTACAA CGTGTGCTCCA TTCGCCGGAA ACCTCGTCA
651 TGACGGCACC TTCGAAACCG ACGAAGAGCA GAAGCTGCCGC AACGAATCCC
701 GCAAGATTCT CGGCCTCCCA GACCTCAAGG TCTCAGGCAC CTGCGTCCGC
751 GTGCCGGTTT TCACCGGCCA CACGCTGACC ATTACGCCG AATTGACAA
801 GGCAATCACC GTCGAGCAGG CGCAGGAGAT CTTGGGTGCC GCTTCAGGCG
851 TCGAGCTTGT CGACGTCCA ACCCCACTTG CAGCTGCCGG CATTGACGAA
901 TCCCTCGTTG GACGCATCCG TCAGGACTCC ACTGTCGACG ACAACCGCGG
951 TCTGGTTCTC GTCGTATCTG GCGATAACCT TCGCAAGGGC GCAGCACTGA
1001 ACACCATTCA GATTGCTGAG CTGCTGGTTA AGTAA

```

FIG. 4

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Amino acid sequence of ATCC21529 asd (SEQ ID NO:4)

```

ATGACCACCATCGCAGTTGGTGCACCGGCCAGGTGGCCAGGTTATGCGCACCTT
1 -----+-----+-----+-----+-----+-----+-----+ 60
M T T I A V V G A T G Q V G Q V M R T F

TTGGAAGAGCGCAATTCCCAGCTGACACTGTTCGTTCTTGCTTCCCCGCGTCCGCA
61 -----+-----+-----+-----+-----+-----+-----+ 120
L E E R N F P A D T V R F F A S P R S A

GGCCGTAAGATTGAATTCCGTGGCACGGAAATCGAGGTAGAACATTACTCAGGCAACC
121 -----+-----+-----+-----+-----+-----+-----+ 180
G R K I E F R G T E I E V E D I T Q A T

GAGGAGTCCCTCAAGGGCATCGACGTTGCGTTCTCTGCTGGAGGCACCGCTTCCAAG
181 -----+-----+-----+-----+-----+-----+-----+ 240
E E S L K G I D V A L F S A G G T A S K

CAGTACGCTCCACTGTTGCTGCTGCAGGCGCGACTGTTGTGGATAACTCTCTGCTTGG
241 -----+-----+-----+-----+-----+-----+-----+ 300
Q Y A P L F A A A G A T V V D N S S A W

CGCAAGGACGACGAGGTTCCACTAATCGTCTCTGAGGTGAACCCCTCCGACAAGGATTCC
301 -----+-----+-----+-----+-----+-----+-----+ 360
R K D D E V P L I V S E V N P S D K D S

CTGGTCAAGGGCATTATTGCGAATCTAACTGCACCAACATGGCTGCAATGCCAGTGCTG
361 -----+-----+-----+-----+-----+-----+-----+ 420
L V K G I I A N P N C T T M A A M P V L

AAGCCACTGCACGATGCCGCTGGTCTGTAAAGCTTCACGTTCTTACCAAGGCTGTT
421 -----+-----+-----+-----+-----+-----+-----+ 480
K P L H D A A G L V K L H V S S Y Q A V

TCCGGTTCTGGTCTTGCAGGTGTGGAAACCTGGCAAAGCAGGTTGCTGCAGTTGGCGAC
481 -----+-----+-----+-----+-----+-----+-----+ 540
S G S G L A G V E T L A K Q V A A V G D

```

FIG.5A

APPROVED BY	O.G. FIG. CLASS	SUBCLASS
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 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

CACAAACGTTGAGTTCGTCATGATGGACAGGCTGCTGACGCAGGCCATGTCGGACCTTAC
 541 -----+-----+-----+-----+-----+-----+-----+ 600
 H N V E F V H D G Q A A D A G D V G P Y
 GTTTCCCCAATCGCTTACAACGTGCTGCCATTGCCGGAAACCTCGTCGATGACGGCACC
 601 -----+-----+-----+-----+-----+-----+-----+ 660
 V S P I A Y N V L P F A G N L V D D G T
 TTCGAAACCGACGAAGAGCAGAAGCTGCGCAACGAATCCCGCAAGATTCTCGGCCTCCCA
 661 -----+-----+-----+-----+-----+-----+-----+ 720
 F E T D E E Q K L R N E S R K I L G L P
 GACCTCAAGGTCTCAGGCACCTGCGTCCCGTGCCGGTTTCACCGGCCACACGCTGACC
 721 -----+-----+-----+-----+-----+-----+-----+ 780
 D L K V S G T C V R V P V F T G H T L T
 ATTACACGCCGAATTGACAAGGCAATCACCGTCGAGCAGGCGCAGGAGATCTTGGGTGCC
 781 -----+-----+-----+-----+-----+-----+-----+ 840
 I H A E F D K A I T V E Q A Q E I L G A
 GCTTCAGGCGTCGAGCTTGTGACGTCCAACCCCCACTTGCAGCTGCCGGCATTGACGAA
 841 -----+-----+-----+-----+-----+-----+-----+ 900
 A S G V E L V D V P T P L A A A G I D E
 TCCCTCGTTGGACGCATCCGTCAAGGACTCCACTGTCGACGACAACCGCGGTCTGGTTCTC
 901 -----+-----+-----+-----+-----+-----+-----+ 960
 S L V G R I R Q D S T V D D N R G L V L
 GTCGTATCTGGCGATAACCTTCGCAAGGGCGCAGCACTGAACACCATTAGATTGCTGAG
 961 -----+-----+-----+-----+-----+-----+-----+ 1020
 V V S G D N L R K G A A L N T I Q I A E
 CTGCTGGTTAAGTAA
 1021 -----+----- 1035
 L L V K *

FIG.5B

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 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of dapA (SEQ ID NO:5)

```

1 ATGAGCACAG GTTTAACAGC TAAGACCGGA GTAGAGCACT TCGGCACCGT
51 TGGAGTAGCA ATGGTTACTC CATTACCGA ATCCGGAGAC ATCGATATCG
101 CTGCTGCCG CGAACGTCGCG GCTTATTGG TTGATAAGGG CTTGGATTCT
151 TTGGTTCTCG CGGGCACACAC TGGTGAATCC CCAACGACAA CCGCCGCTGA
201 AAAACTAGAA CTGCTCAAGG CCGTCGTGA GGAAGTTGGG GATCGGGCGA
251 AGCTCATCGC CGGTGTCGGA ACCAACACA CGCGGACATC TGTGGAACCTT
301 GCGGAAGCTG CTGCTTCTGC TGGCGCAGAC GGCCTTTAG TTGTAACCTC
351 TTATTACTCC AAGCCGAGCC AAGAGGGATT GCTGGCGCAC TTGGGTGCAA
401 TTGCTGCAGC AACAGAGGTT CCAATTGTC TCTATGACAT TCCTGGTCGG
451 TCAGGTATTG CAATTGAATC TGATACCATG AGACGCCCTGA GTGAATTACC
501 TACGATTTG GCGGTCAAGG ACGCCAAGGG TGACCTCGTT GCAGCCACGT
551 CATTGATCAA AGAAACGGGA CTTGCCTGGT ATTCAAGGCGA TGACCCACTA
601 AACCTTGTTT GGCTTGCTTT GGGCAGGATCA GGTTTCATT CCGTAATTGG
651 ACATGCAGCC CCCACAGCAT TACGTGAGTT GTACACAAGC TTCGAGGAAG
701 GCGACCTCGT CCGTGCACGG GAAATCAACG CCAAACATAC ACCGCTGGTA
751 GCTGCCAAG GTCGCTTGGG TGGAGTCAGC TTGGCAAAAG CTGCTcTGCG
801 TCTGCAGGGC ATCAACGTAG GAGATCCTCG ACTTCCAATT ATGGCTCCAA
851 ATGAGCAGGA ACTTGAGGCT CTCCGAGAAG ACATGAAAAA AGCTGGAGTT
901 CTATAA

```

FIG. 6

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Amino acid sequence of dapA (SEQ ID NO:6)

ATGAGCACAGGTTAACAGCTAACAGGGAGTAGAGCACTCGGCACCGTTGGAGTAGCA
1 -----+-----+-----+-----+-----+-----+ 60

M S T G L T A K T G V E H F G T V G V A

ATGGTTACTCCATTACGGAAATCCGGAGACATCGATATCGCTGCTGGCCGCGAAGTCGCG
61 -----+-----+-----+-----+-----+-----+ 120

M V T P F T E S G D I D I A A G R E V A

GCTTATTTGGTTGATAAGGGCTTGGATTCTTGTTCTCGCGGGCACCACGGTGAATCC
121 -----+-----+-----+-----+-----+-----+ 180

A Y L V D K G L D S L V L A G T T G E S

CCAACGACAACCGCCGCTGAAAAACTAGAACTGCTCAAGGCCGTTCGTGAGGAAGTTGGG
181 -----+-----+-----+-----+-----+-----+ 240

P T T T A A E K L E L L K A V R E E V G

GATCGGGCGAAGCTCATCGCCGGTGTGGAACCAACAACACGGCGGACATCTGTGGAACCT
241 -----+-----+-----+-----+-----+-----+ 300

D R A K L I A G V G T N N T R T S V E L

GCAGGAAGCTGCTGCTTCTGCTGGCGCAGACGGCCTTTAGTTGTAACTCCTTATTACTCC
301 -----+-----+-----+-----+-----+-----+ 360

A E A A A S A G A D G L L V V T P Y Y S

AAGCCGAGCCAAGAGGGATTGCTGGCGACTTCGGTGCAATTGCTGCAGCAACAGAGGTT
361 -----+-----+-----+-----+-----+-----+ 420

K P S Q E G L L A H F G A I A A A T E V

CCAATTGTCTATGACATTCTGGTCGGTCAGGTATTCCAATTGAATCTGATACCATG
421 -----+-----+-----+-----+-----+-----+ 480

P I C L Y D I P G R S G I P I E S D T M

FIG.7A

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AGACGCCTGAGTGAATTACCTACGATTTGGCGGTCAAGGACGCCAAGGGTGACCTCGTT
 481 -----+-----+-----+-----+-----+-----+-----+ 540

R R L S E L P T I L A V K D A K G D L V

GCAGCCACGTCATTGATCAAAGAAACGGGACTTGCCTGGTATTCAAGGCGATGACCCACTA
 541 -----+-----+-----+-----+-----+-----+-----+ 600

A A T S L I K E T G L A W Y S G D D P L

AACCTTGTGGCTTGCTTGGCGGATCAGGTTTCATTCCGTAATTGGACATGCAGCC
 601 -----+-----+-----+-----+-----+-----+-----+ 660

N L V W L A L G G S G F I S V I G H A A

CCCACAGCATTACGTGAGTTGTACACAAGCTCGAGGAAGGCGACCTCGTCCGTGCGCGG
 661 -----+-----+-----+-----+-----+-----+-----+ 720

P T A L R E L Y T S F E E G D L V R A R

GAAATCAACGCCAAACTATCACCGCTGGTAGCTGCCAAGGTCGCTTGGGTGGAGTCAGC
 721 -----+-----+-----+-----+-----+-----+-----+ 780

E I N A K L S P L V A A Q G R L G G V S

TTGGCAAAAGCTGCTctGCGTCTGCAGGGCATAACGTAGGAGATCCTCGACTTCCAATT
 781 -----+-----+-----+-----+-----+-----+-----+ 840

L A K A A L R L Q G I N V G D P R L P I

ATGGCTCCAAATGAGCAGGAACTTGAGGCTCTCCGAGAAGACATGAAAAAGCTGGAGTT
 841 -----+-----+-----+-----+-----+-----+-----+ 900

M A P N E Q E L E A L R E D M K K A G V

CTATAA
 901 ----- 906

L * -

FIG. 7B

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Nucleotide sequence of dapB (SEQ ID NO:7)

```

1 ATGGGAATCA AGGTTGGCGT TCTCGGAGCC AAAGGCCGTG TTGGTCAAAC
51 TATTGTGGCA GCAGTCAATG AGTCCGACGA TCTGGAGCTT GTTGCAGAGA
101 TCGGCGTCGA CGATGATTTG AGCCTTCTGG TAGACAACCGG CGCTGAAGTT
151 GTCGTTGACT TCACCACTCC TAACGCTGTG ATGGGCAACC TGGAGTTCTG
201 CATCAACAAAC GGCATTTCTG CGGTTGTTGG AACCACGGGC TTCGATAATG
251 CTCGTTTGGA GCAGGGTTCGC GcCTGGCTTG AAGGAAAAGA CAATGTCGGT
301 GTTCTGATCG CACCTAACTT TGCTATCTCT GCGGTGTTGA CCATGGTCTT
351 TTCCAAGCAG GCTGCCGCT TCTTCGAATC AGCTGAAGTT ATTGAGCTGC
401 ACCACCCCCAA CAAGCTGGAT GCACCTTCAG GCACCGCGAT CCACACTGCT
451 CAGGGCATTG CTGCGGCACG CAAAGAACGCA GGCATGGACG CACAGCCAGA
501 TGCGACCGAG CAGGCACTTG AGGGTTCCCG TGGCGCAAGC GTAGATGGAA
551 TCCCAGTTCA cGCAGTCCGC ATGTCCGGCA TGGTTGCTCA CGAGCAAGTT
601 ATCTTTGGCA CCCAGGGTCA GACCTTGACC ATCAAGCAGG ACTCCTATGA
651 TCGCAACTCA TTTGCACCAAG GTGTCTGGT GGGTGTGCGC AACATTGCAC
701 AGCACCCAGG CCTAGTCGTA GGACTTGAGC ATTACCTAGG CCTGTAA

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FIG. 8

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Amino acid sequence of dapB (SEQ ID NO:8)

```

ATGGGAATCAAGGTTGGCGTTCTCGGAGCAAAGGCCGTGTTGGTCAAACATTGTGGCA
1 -----+-----+-----+-----+-----+-----+ 60

M G I K V G V L G A K G R V G Q T I V A

GCAGTCATGAGTCCGACGATCTGGAGCTTGTGAGAGATCGGCGTCGACGATGATTG
61 -----+-----+-----+-----+-----+-----+ 120

A V N E S D D L E L V A E I G V D D D L

AGCCTTCTGGTAGACAACGGCGCTGAAGTTGTCGTTGACTTCACCACTCCTAACGCTGTG
121 -----+-----+-----+-----+-----+-----+ 180

S L L V D N G A E V V V D F T T P N A V

ATGGGCAACCTGGAGTTCTGCATCAACAACGGCATTTCTGCGGTTGGAACCAACGGC
181 -----+-----+-----+-----+-----+-----+ 240

M G N L E F C I N N G I S A V V G T T G

TTCGATAATGCTCGTTGGAGCAGGTTGCGCTGGCTTGAAAGGAAAAGACAATGTCGGT
241 -----+-----+-----+-----+-----+-----+ 300

F D N A R L E Q V R A W L E G K D N V G

GTTCTGATCGCACCTAACCTTGCTATCTCTGCGGTGTTGACCATGGCTTTCCAAGCAG
301 -----+-----+-----+-----+-----+-----+ 360

V L I A P N F A I S A V L T M V F S K Q

GCTGCCGCTTCTCGAACAGCTGAAGTTATTGAGCTGCACCACCCAACAGCTGGAT
361 -----+-----+-----+-----+-----+-----+ 420

A A R F F E S A E V I E L H H P N K L D

```

FIG.9A

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GCACCTTCAGGCACCGCGATCCACACTGCTCAGGGCATTGCTGCGGCACGCAAAGAAGCA
 421 -----+-----+-----+-----+-----+-----+ 480

A P S G T A I H T A Q G I A A A R K E A

GGCATGGACGCACAGCCAGATGCGACCGAGCAGGCACTTGAGGGTTCCGTGGCGCAAGC
 481 -----+-----+-----+-----+-----+-----+ 540

G M D A Q P D A T E Q A L E G S R G A S

GTAGATGGAATCCC^aGTTCAcGCAGTCCGCATGTCCGGCATGGTTGCTACGAGCAAGTT
 541 -----+-----+-----+-----+-----+-----+ 600

V D G I P V H A V R M S G M V A H E Q V

ATCTTGGCACCCAGGGTCAGACCTTGACCATCAAGCAGGACTCCTATGATCGCAACTCA
 601 -----+-----+-----+-----+-----+-----+ 660

I F G T Q G Q T L T I K Q D S Y D R N S

TTTGCACCAGGTGTCTTGGTGGGTGTGCGAACATTGCACAGCACCCAGGCCTAGTCGTA
 661 -----+-----+-----+-----+-----+-----+ 720

F A P G V L V G V R N I A Q H P G L V V

GGACTTGAGCATTACCTAGGCCTGTAA
 721 -----+-----+----- 747

G L E H Y L G L *

FIG.9B

APPROVED BY	O.G. FIG.
DRAFTSMAN	CLASS SUBCLASS

Sheet 14 of 36

Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

Nucleotide sequence of ddh (SEQ ID NO:9)

```

1 ATGCATTTCG GTAAGCTCGA CCAGGACAGT GCCACCACAA TTTGGAGGA
51 TTACAAGAAC ATGACCAACA TCCGCGTAGC TATCGTaGGC TACGGAAACC
101 TGGGACGCAG CGTCGAAAAG CTTATTGCCA AGCAGCCCAGA CATGGACCTT
151 GTAGGAATCT TCTCGCGCCG GGCCACCCCTC GACACAAAGA CGCCAGTCTT
201 TGATGTGCC GACGTGGACA AGCACGCCGA CGACGTGGAC GTGCTGTTCC
251 TGTGCATGGG CTCCGCCACC GACATCCCTG AGCAGGCACC AAAGTTCGCG
301 CAGTTCGCCT GCACCGTAGA CACCTACGAC AACCACCGCG ACATCCCACG
351 CCACCGCCAG GTCATGAACG AAGCCGCCAC CGCAGCCGGC AACGTTGCAC
401 TGGTCTCTAC CGGCTGGGAT CCAGGAATGT TCTCCATCAA CCGCGTCTAC
451 GCAGCGGCAG TCTTAGCCGA GCACCAGCAG CACACCTTCT GGGGCCAGG
501 TTTGTCACAG GGCCACTCCG ATGCTTGCG ACGCATCCCT GGCGTTCAAA
551 AGGCCGTCCA GTACACCCCTC CCATCCGAAG AaGCCCTGGA AAAGGCCCGC
601 CGTGGCGAAG CCGGCGACCT cACC GGAAAG CAAACCCACA AGCGCCAATG
651 CTTCGTGGTT GCCGACGCGG CCGAcCACGA GCGCATCGAA AACGACATCC
701 GCACCATGCC TGATTACTTC GTTGGCTACG AAGTCGAAGT CAACTTCATC
751 GACGAAGCAA CCTTgGACgC CGAGCACACC GGCATGCCAC ACGGcGGaCA
801 CGTGATcACC ACCGGCGACA CCGGTGGCTT CAACCACACC GTGGAATACA
851 TCCTgAAGCT GGACCGAAAC CCAGATTCA CCGCTTtTC ACAGATCGCT
901 TTCGGcCGCG CAGCTCACCG CATGAAGCAG CAGGGCCAAA GCGGtGCTTT
951 CACCGTCCTC GAAGTTGCTC CATACTTGCT CTCCCCgGAG AACTTGGAtG
1001 ATCTGATCGC ACGCGACGTC TAA

```

FIG. 10

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	

Amino acid sequence of ddh (SEQ ID NO:10)

```

ATGCATTTGGTAAGCTGACCAGGACAGTGCCACCACAATTTGGAGGATTACAAGAAC
1 -----+-----+-----+-----+-----+-----+-----+ 60
M H F G K L D Q D S A T T I L E D Y K N
ATGACCAACATCCCGTAGCTATCGtaGGCTACGGAAACCTGGGACGCGAGCGTCGAAAAG
61 -----+-----+-----+-----+-----+-----+-----+ 120
M T N I R V A I V G Y G N L G R S V E K
CTTATTGCCAAGCAGCCCACATGGACCTTGTAGGAATCTTCTCGCGCCGGGCCACCCCTC
121 -----+-----+-----+-----+-----+-----+-----+ 180
L I A K Q P D M D L V G I F S R R A T L
GACACAAAGACGCCAGTCTTGATGTCGCCACGTGGACAAGCACGCCACGACGTGGAC
181 -----+-----+-----+-----+-----+-----+-----+ 240
D T K T P V F D V A D V D K H A D D V D
GTGCTGTTCTGTGCATGGGCTCCGCCACCGACATCCCTGAGCAGGCCACCAAAGTTCGCG
241 -----+-----+-----+-----+-----+-----+-----+ 300
V L F L C M G S A T D I P E Q A P K F A
CAGTTGCCTGCACCGTAGACACCTACGACAACCACCGCGACATCCCACGCCACCGCCAG
301 -----+-----+-----+-----+-----+-----+-----+ 360
Q F A C T V D T Y D N H R D I P R H R Q
GTCATGAACGAAGGCCACCGCAGCCGGCAACGTTGCACTGGTCTCTACCGGCTGGGAT
361 -----+-----+-----+-----+-----+-----+-----+ 420
V M N E A A T A A G N V A L V S T G W D
CCAGGAATGTTCTCCATCAACCGCGTCTACGCAGCGGAGTCTTAGCCAGCACCGCAG
421 -----+-----+-----+-----+-----+-----+-----+ 480
P G M F S I N R V Y A A A V L A E H Q Q
CACACCTTCTGGGGCCCAGGTTGTACAGGGCACTCCGATGCTTGCAGCGCATCCCT
481 -----+-----+-----+-----+-----+-----+-----+ 540
H T F W G P G L S Q G H S D A L R R I P

```

FIG.11A

APPROVED	O.G. FIG.
BY	
DRAFTSMAN	CLASS SUBCLASS

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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

GGCGTTCAAAAGGcGTCCAGTACACCCCTCCATCCGAAGAaGCCCTGGAAAAGGCCCGC
 541 -----+-----+-----+-----+-----+-----+ 600
 G V Q K A V Q Y T L P S E E A L E K A R
 CGTGGCGAAGGCCGGCGACCTcACCGGAAAGCAAACCCACAAGCGCCAATGCTTCGTGGTT
 601 -----+-----+-----+-----+-----+-----+-----+ 660
 R G E A G D L T G K Q T H K R Q C F V V
 GCCGACGC GGCGAcCACGAGCGCATCGAAAACGACATCCGCACCATGCCTGATTACTTC
 661 -----+-----+-----+-----+-----+-----+ 720
 A D A A D H E R I E N D I R T M P D Y F
 GTTGGCTACGAAGTCGAAGTCAACTTCATCGACGAAGCAACCTTgGACgCCGAGCACACC
 721 -----+-----+-----+-----+-----+-----+ 780
 V G Y E V E V N F I D E A T L D A E H T
 GGCATGCCACACGGcGGaCACGTGATcACCACCGGCGACACCGGTGGCTTCAACCACACC
 781 -----+-----+-----+-----+-----+-----+ 840
 G M P H G G H V I T T G D T G G F N H T
 GTGGAATACATCCTgAAGCTGGACCGAAACCCAGATTTCACCGCTTCTCACAGATCGCT
 841 -----+-----+-----+-----+-----+-----+ 900
 V E Y I L K L D R N P D F T A S S Q I A
 TTGGGcCGCGCAGCTCACCGCATGAAGCAGCAGGGCAAAGCGGtGCTTCACCGTCTC
 901 -----+-----+-----+-----+-----+-----+ 960
 F G R A A H R M K Q Q G Q S G A F T V L
 GAAGTTGCTCCATACTTGCTCTCCCCgGAGAACCTGGAtGATCTGATCGCACGCGACGTC
 961 -----+-----+-----+-----+-----+-----+ 1020
 E V A P Y L L S P E N L D D L I A R D V
 TAA
 1021 --- 1023

FIG.11B

APPROVED	O. G. FIG.
BY	C. ASS. SUBCLASS
DRAFTSMAN	

Sequence of full length LysA from NRRL B-11474 (SEQ ID NO: 11);
 Underlined region: the priming site for lysA primer

ATGGCTACAGTTGAAAATTCAATGAACCTCCCGCACACGTATGGCCACGCAATGCAGTG
 CGCCAAGAACGCGTGTGTCACCGTCGCTGGTGTGCCTCTGCCTGACCTCGCTGAAGAA
 TACGGAACCCCACGTGTCGTAGTCGACGAGGACGATTCCGTTCCGCTGTCGCGACATG
 GCTACCGCATTGGTGGACCAGGCAATGTGCACTACGCATCCAAAGCGTTCCGTGACCAAG
 ACCATTGCACGTTGGGTTGATGAAGAGGGGCTGGCACTGGACATTGCGTCCATCAATGAA
 CTGGGCATTGCCCTGGCCGCTGGTTCCCGGCCAGCCGTATCACCAGCGCACGGCAACAAC
 AAAGGCGTAGAGTTCCCTGCGCGCGTGGTTCAAAACGGTGTGGCATGTGGTGTGGAC
 TCCCGCGAGGAATTGGAACTGCTGGATTACGTTGCCGCTGGTAAGGCAAGATCCAGGAC
 GTGTTGATCCCGCGTGAAGGCCAGGTATCGAAGCCCACACCCACGAGTTATCGCCACTAGC
 CACGAAGACCAGAAGTTGGATTCTCCCTGGCATCCGGTCCGATTGAAAGCAGCGAAA
 GCAGCCAACAATGCAGAGAACCTGAACCTGGTTGGTCTGCACTGCCATGTTGGTCCAG
 GTGTTGACGCCGAAGGCTTCAAGCTGGCAGCAGAGCGCGTGTGGCATGTACTCACAG
 ATCCACAGCGAACTAGGTGTCGCCCTCCTGAGCTGGACCTCGGTGGCGATACGGCATC
 GCCTACACTGCAGATGAGGAACCACTCAACGTCGCAGAAGGTCGCCTCCGACCTACTCACC
 GCAGTCGGAAAAATGGCAGCGGAACTAGGCATCGACGCACCAACCGTGTGTTGAGCCC
 GGCGCGCTATCGCAGGCCCCCTCACCCTGACCATCTACGAAGTCGGCACCAACCAAAAC
 GTCCACGTAGACGACGACAAAACCCGCCGCTACGTAGCCGTCGACGGAGGCATGTCCGAC
 AACATCCGCCAGCACTTACGGCTCCGAATACGACGCCCGTAGTATCCGCTTCGCC
 GAAGGAGACCCAGTAAGCACCCGCATCGTGGGCTCCACTGCGAATCCGGCGATATCCTG
 ATCAACGATGAAATCTACCCATCTGACATCACCAGCGCGACTTCCCTGCACTCGCAGCC
 ACCGGCGCATACTGCTACGCCATGAGCTCCCGTACAACGCCCTCACACGGCCCCGCCGTC
 GTGTCCGTCCGCCGCTGGCAGCTCCGCCATGCTGCGCCGAAACCCCTGACGACATC
 CTCTCACTAGAGGCATAA

FIG.12

APPROVED	O.G. FIG.
BY	CLASS: SUBCLASS
DRAFTSMAN	

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Appl. No. 09/722,441; Group Art Unit: 1645
Dkt. No. 1533.1030002; Batch No.: To Be Assigned
Inventor(s): Hanke et al.; Tel: 202/371-2600
Title: Increased Lysine Production by Gene Amplification

Full length sequence of LysA (NRRL-B11474)
DIAMINOPIMELATE DECARBOXYLASE (Lys A) (SEQ ID NO:12)

MATVENFNELPAHVWPRNAVRQEDGVVTAGVPLPDLAEYGTPLFVVDEDDFRSRCRD
ATAFGGPGNVHYASKAFLTKTIARWVDEEGLALDIASINELGIALAAGFPASRITAHGNN
KGVEFLRALVQNGVGHVVLDQAQELELLDYVAAGEGKIQDVLIRVKPGIEAHTHEFIATS
HEDQKFGFSLASGSAFEAAKAANNAENLNIVGLHCHVGSQVFDAEGFKLAAERVLGLYSQ
IHSELGVALPELDLGGGYGIAYTADEEPLNVAEVASDLLTAVGKMAELGIDAPTVLVEP
GRAIAGPSTVTIYEVGTTKNVHVDDDKTRRYVAVDGGMSDNIRPALYGSEYDARVVSRAF
EGDPVSTRIVGSHCESGDLINDEIYPSDITSGDFLALAATGACYAMSSRYNAFTRPAV
VSVRAGSSRLMLRRETLDL1LSLEA

FIG. 13

Sub
62

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	

Nucleotide sequence of AS019 lysA (SEQ ID NO:13) (pRS6)

```

1 ATGGCTACAG TTGAAAATT CAATGAACCT CCCGCACACG TATGGCCACG
51 CAATGCCGTG CGCCAAGAAAG ACGGCGTTGT CACCGTCGCT GGTGTGCCTC
101 TGCCTGACCT CGCTGAAGAA TACGGAACCC CACTGTTCGT AGTCGACGAG
151 GACGATTTCG GTTCCCCTG TCGCGACATG GCTACCGCAT TCGGTGGACC
201 AGGCAATGTG CACTACGCAT CTAAAGCGTT CCTGACCAAG ACCATTGCAC
251 GTTGGGTTGA TGAAGAGGGG CTGGCACTGG ACATTGCATC CATCAACGAA
301 CTGGGCATTG CCCTGGCCGC TGTTTCCCC GCCAGCCGTA TCACCGCGCA
351 CGGCAACAAC AAAGGCGTAG AGTTCCCTGCG CGCGTTGGTT CAAAACGGTG
401 TGGGACACGT GGTGCTGGAC TCCGCACAGG AACTAGAACT GTTGGATTAC
451 GTTGGCCTG GTGAAGGCAGA GATTCAAGGAC GTGTTGATCC GCGTAAAGCC
501 AGGCATCGAA GCACACACCC ACGAGTTCAT CGCCACTAGC CACGAAGACC
551 AGAAGTTCCGG ATTCTCCCTG GCATCCGGTT CCGCATTCTGA AGCAGCAAAA
601 GCCGCCAACAAACG CAGCAGAAAA CCTGAACCTG GTTGGCCTGC ACTGCCACGT
651 TGTTTCCCAG GTGTTCGACG CCGAAGGCTT CAAGCTGGCA GCAGAACGCG
701 TGTTGGGCCT GTACTCACAG ATCCACAGCG AACTGGGCGT TGCCCTTCCT
751 GAACTGGATC TCGGTGGCGG ATACGGCATT GCCTATAACCG CAGCTGAAGA
801 ACCACTCAAC GTCGCAGAAG TTGCCTCCGA CCTGCTCACC GCAGTCGGAA
851 AAATGGCAGC GGAACCTAGGC ATCGACGCAC CAACCGTGCT TGTTGAGCCC
901 GGCCGCGCTA TCGCAGGCCCTC CACCGTG ACCATCTACG AAGTCGGCAC
951 CACCAAAGAC GTCCACGTAG ACGACGACAA AACCCGCCGT TACATCGCCG
1001 TGGACGGAGG CATGTCCGAC AACATCCGCC CAGCACTCTA CGGCTCCGAA
1051 TACGACGCC GCGTAGTATC CCGCTTCGCC GAAGGAGACC CAGTAAGCAC
1101 CCGCATCGTG GGCTCCCACT GCGAATCCGG CGATATCCTG ATCAACGATG
1151 AAATCTACCC ATCTGACATC ACCAGCGGCG ACTTCCTTGC ACTCGCAGCC
1201 ACCGGCGCAT ACTGCTACGC CATGAGCTCC CGCTACAACG CCTTCACACG
1251 GCCCGCCGTC GTGTCCGTCC GCGCTGGCAG CTCCCGCCTC ATGCTGCGCC
1301 CGGAAACGCT CGACGACATC CTCTCACTAG AGGCATAA

```

FIG.14

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	

Full length amino acid sequence of lysA (pRS6) (SEQ ID NO:14)

```

ATGGCTACAGTTGAAAATTCAATGAACCTCCCGCACACGTATGCCACGCAATGCCGTG
1 .....+.....+.....+.....+.....+.....+ 60

M A T V E N F N E L P A H V W P R N A V

CGCCAAGAACGCGTGTGACCGTCGCTGGTGTGCCTTGCCCTGACCTCGCTGAAGAA
61 .....+.....+.....+.....+.....+.....+ 120

R Q E D G V V T V A G V P L P D L A E E

TACGGAACCCCAC TGTTCGTAGTCGACGAGGACGATTCCGTTCCGCTGTCGCGACATG
121 .....+.....+.....+.....+.....+.....+ 180

Y G T P L F V V D E D D F R S R C R D M

GCTACCGCATT CGGTGGACCAGGCAATGTGCACTACGCATCTAAAGCGTTCCGTGACCATG
181 .....+.....+.....+.....+.....+.....+ 240

A T A F G G P G N V H Y A S K A F L T K

ACCATTGCACGTTGGTTGATGAAGAGGGGCTGGCACTGGACATTGCATCCATCAACGAA
241 .....+.....+.....+.....+.....+.....+ 300

T I A R W V D E E G L A L D I A S I N E

CTGGGCATTGCCCTGGCCGCTGGTTCCCGCCAGCCGTATCACCAGCGCACGGCAACAAAC
301 .....+.....+.....+.....+.....+.....+ 360

L G I A L A A G F P A S R I T A H G N N

AAAGGCGTAGAGTTCTGCGCGCTGGTTCAAAACGGTGTGGACACGTGGTGTGGAC
361 .....+.....+.....+.....+.....+.....+ 420

K G V E F L R A L V Q N G V G H V V L D

TCCGCACAGGAACTAGAACTGTTGGATTACGTTGCCGCTGGTAAGGCAAGATTCAAGGAC
421 .....+.....+.....+.....+.....+.....+ 480

S A Q E L E L L D Y V A A G E G K I Q D

```

FIG.15A

APPROVED BY	C.G. FIG.
DRAFTSMAN	CLASS SUBCLASS

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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

GTGTTGATCCCGTAAAGCCAGGCATCGAAGCACACACCCACGAGTTCATGCCACTAGC
 481 -----+-----+-----+-----+-----+-----+-----+ 540
 V L I R V K P G I E A H T H E F I A T S

 CACGAAGACCAGAACGTTGGATTCTCCCTGGCATCCGGTCCGCATTGAAGCAGCAAAA
 541 -----+-----+-----+-----+-----+-----+-----+ 600
 H E D Q K F G F S L A S G S A F E A A K

 GCCGCCAACAAACGCGAGAAACCTGAACCTGGTTGGCCTGCACTGCCACGTTGGTCCCAG
 601 -----+-----+-----+-----+-----+-----+-----+ 660

 A A N N A E N L N L V G L H C H V G S Q

 GTGTTCGACGCCGAAGGCTTCAAGCTGGCAGCAGAACGCGTGTTGGCCTGTACTCACAG
 661 -----+-----+-----+-----+-----+-----+-----+ 720

 V F D A E G F K L A A E R V L G L Y S Q

 ATCCACAGCGAACTGGGCGTTGCCCTTCCTGAACTGGATCTGGTGGCGGATACGGCATT
 721 -----+-----+-----+-----+-----+-----+-----+ 780

 I H S E L G V A L P E L D L G G G Y G I

 GCCTATAACCGCAGCTGAAGAACCACTAACGTGCAGAACGTTGCCTCCGACCTGCTCACC
 781 -----+-----+-----+-----+-----+-----+-----+ 840

 A Y T A A E E P L N V A E V A S D L L T

 GCAGTCGGAAAAATGGCAGCGGAACTAGGCATCGACGCCAACCGTGCTTGAGCCC
 841 -----+-----+-----+-----+-----+-----+-----+ 900

 A V G K M A A E L G I D A P T V L V E P

 GGCCCGCCTATCGCAGGCCCTCCACCGTGACCATCTACGAAGTCGGCACCACCAAAGAC
 901 -----+-----+-----+-----+-----+-----+-----+ 960

 G R A I A G P S T V T I Y E V G T T K D

FIG.15B

APPROVED BY	O.G. FIG.
DRAFTSMAN	CLASS SUBCLASS

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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

GTCCACGTAGACGACGACAAAACCGCCGTTACATGCCGTGGACGGAGGCATGTCCGAC
 961 -----+-----+-----+-----+-----+-----+-----+ 1020

V H V D D D K T R R Y I A V D G G M S D

AACATCCGCCAGCACTCTACGGCTCGAATACGACGCCCGTAGTATCCCCTCGCC
 1021 -----+-----+-----+-----+-----+-----+-----+ 1080

N I R P A L Y G S E Y D A R V V S R F A

GAAGGGAGACCCAGTAAGCACCCGCATCGTGGGCTCCACTGCGAATCCGGCGATATCCTG
 1081 -----+-----+-----+-----+-----+-----+-----+ 1140

E G D P V S T R I V G S H C E S G D I L

ATCAACGATGAAATCTACCATCTGACATCACCAAGCGGCAGTCCTGCAGCC
 1141 -----+-----+-----+-----+-----+-----+-----+ 1200

I N D E I Y P S D I T S G D F L A L A A

ACCGGCCATACTGCTACGCCATGAGCTCCGCTACAACGCCTCACACGGCCCGTC
 1201 -----+-----+-----+-----+-----+-----+-----+ 1260

T G A Y C Y A M S S R Y N A F T R P A V

GTGTCCGTCCGCCGCTGGCAGCTCCGCCATGCTGCGCCGCAAACGCTCGACGACATC
 1261 -----+-----+-----+-----+-----+-----+-----+ 1320

V S V R A G S S R L M L R R E T L D D I

CTCTCACTAGAGGCATAA
 1321 -----+----- 1338

L S L E A *

FIG.15C

APPROVED	O.G. FIG.
BY	
DRAFTSMAN	

Nucleotide sequence of orf2 in dapBA operon (SEQ ID NO:15)

```

1 GTGGCCGAAC AAGTTAAATT GAGCGTGGAG TTGATAGCGT GCAGTTCTTT
51 TACTCCACCC GCTGATGTTG AGTGGTCAAC TGATGTTGAG GGCGCGGAAG
101 CACTCGTCGA GTTGCCTGGT CGTGCCTGCT ACGAAACTTT TGATAAGCCG
151 AACCCCTCGAA CTGCTTCCAA TGCTGCGTAT CTGCGCCACA TCATGGAAGT
201 GGGGCACACT GCTTGCTTG AGCATGCCAA TGCCACGATG TATATCCGAG
251 GCATTTCTCG GTCCCGCGACC CATGAATTGG TCCGACACCG CCATTTTCC
301 TTCTCTCAAC TGTCTCAGCG TTTCGTGCAC AGCGGAGAAT CGGAAGTAGT
351 GGTGCCCACT CTCATCGATG AAGATCCGCA GTTGCCTGAA CTTTCATGC
401 ACGCCATGGA TGAGTCTCGG TTCGCTTCA ATGAGCTGCT TAATGCGCTG
451 GAAGAAAAAC TTGGCGATGA ACCGAATGCA CTTTAAGGA AAAAGCAGGC
501 TCGTCAAGCA GCTCGCGCTG TGCTGCCCAA CGCTACAGAG TCCAGAACATCG
551 TGGTGTCTGG AAACCTCCGC ACCTGGAGGC ATTCATTGG CATGCGAGCC
601 AGTGAACATG CAGACGTCGA AATCCGCGAA GTAGCGGTAG GATGTTAAG
651 AAAGCTGCAG GTAGCAGCGC CAACTGTTT CGGTGATTTT GAGATTGAAA
701 CTTTGGCAGA CGGATCGCAA ATGGCAACAA GCCCGTATGT CATGGACTTT
751 TAA

```

FIG. 16

APPROVED BY	O.G. FIG.
DRAFTSMAN	CLASS SUBCLASS

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Appl. No. 09/722,441; Group Art Unit: 1645
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 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

ORF2 amino acid sequence (SEQ ID NO:16)

```

GTGGCCGAACAAGTTAAATTGAGCGTGGAGTTGATAGCGTCAGTTCTTTACTCCACCC
1 .....+-----+-----+-----+-----+-----+-----+-----+ 60

M A E Q V K L S V E L I A C S S F T P P

GCTGATGTTGAGTGGTCAACTGATGTTGAGGGCGCGGAAGCAGTCGAGTTGCGGGT
61 .....+-----+-----+-----+-----+-----+-----+-----+ 120

A D V E W S T D V E G A E A L V E F A G

CGTGCCTGCTACGAAACTTTGATAAGCCGAACCCTCGAAC TGCTCCAATGCTGCGTAT
121 .....+-----+-----+-----+-----+-----+-----+-----+ 180

R A C Y E T F D K P N P R T A S N A A Y

CTGCGCACATCATGGAAGTGGGGCACACTGCTTGCTTGAGCATGCCAATGCCACGATG
181 .....+-----+-----+-----+-----+-----+-----+-----+ 240

L R H I M E V G H T A L L E H A N A T M

TATATCCGAGGCATTTCTCGGTCCGCGACCCATGAATTGGTCCGACACCGCCATTTTCC
241 .....+-----+-----+-----+-----+-----+-----+-----+ 300

Y I R G I S R S A T H E L V R H R H F S

TTCTCTCAACTGTCTAGCGTTCGTGCACAGCGGAGAACCGAAGTAGTGGTGCCACT
301 .....+-----+-----+-----+-----+-----+-----+-----+ 360

F S Q L S Q R F V H S G E S E V V V P T

CTCATCGATGAAGATCCGCAGTTGCGTGAACCTTCATGCACGCCATGGATGAGTCTCGG
361 .....+-----+-----+-----+-----+-----+-----+-----+ 420

L I D E D P Q L R E L F M H A M D E S R

```

FIG.17A

APPROVED	O.G. FIG.
BY	
DRAFTSMAN	CLASS SUBCLASS

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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

TTCGCTTCAATGAGCTGCTTAATGCGCTGGAAGAAAAACTTGGCGATGAACCGAATGCA
 421 -----+-----+-----+-----+-----+-----+ 480

F A F N E L L N A L E E K L G D E P N A

CTTTAAGGAAAAAGCAGGCTCGTCAAGCAGCTCGCGCTGTGCTGCCAACGCTACAGAG
 481 -----+-----+-----+-----+-----+-----+ 540

L L R K K Q A R Q A A R A V L P N A T E

TCCAGAACATCGTGGTGTCTGGAAACTTCCGCACCTGGAGGCATTTCATTGGCATGCGAGCC
 541 -----+-----+-----+-----+-----+-----+ 600

S R I V V S G N F R T W R H F I G M R A

AGTGAACATGCAGACGTCGAAATCCGCGAAGTAGCGGTAGGATGTTAACGAAAGCTGCAG
 601 -----+-----+-----+-----+-----+-----+ 660

S E H A D V E I R E V A V G C L R K L Q

GTAGCAGCGCCAAGTGTCTGGTGATTTGAGATTGAAACTTGGCAGACGGATCGCAA
 661 -----+-----+-----+-----+-----+-----+ 720

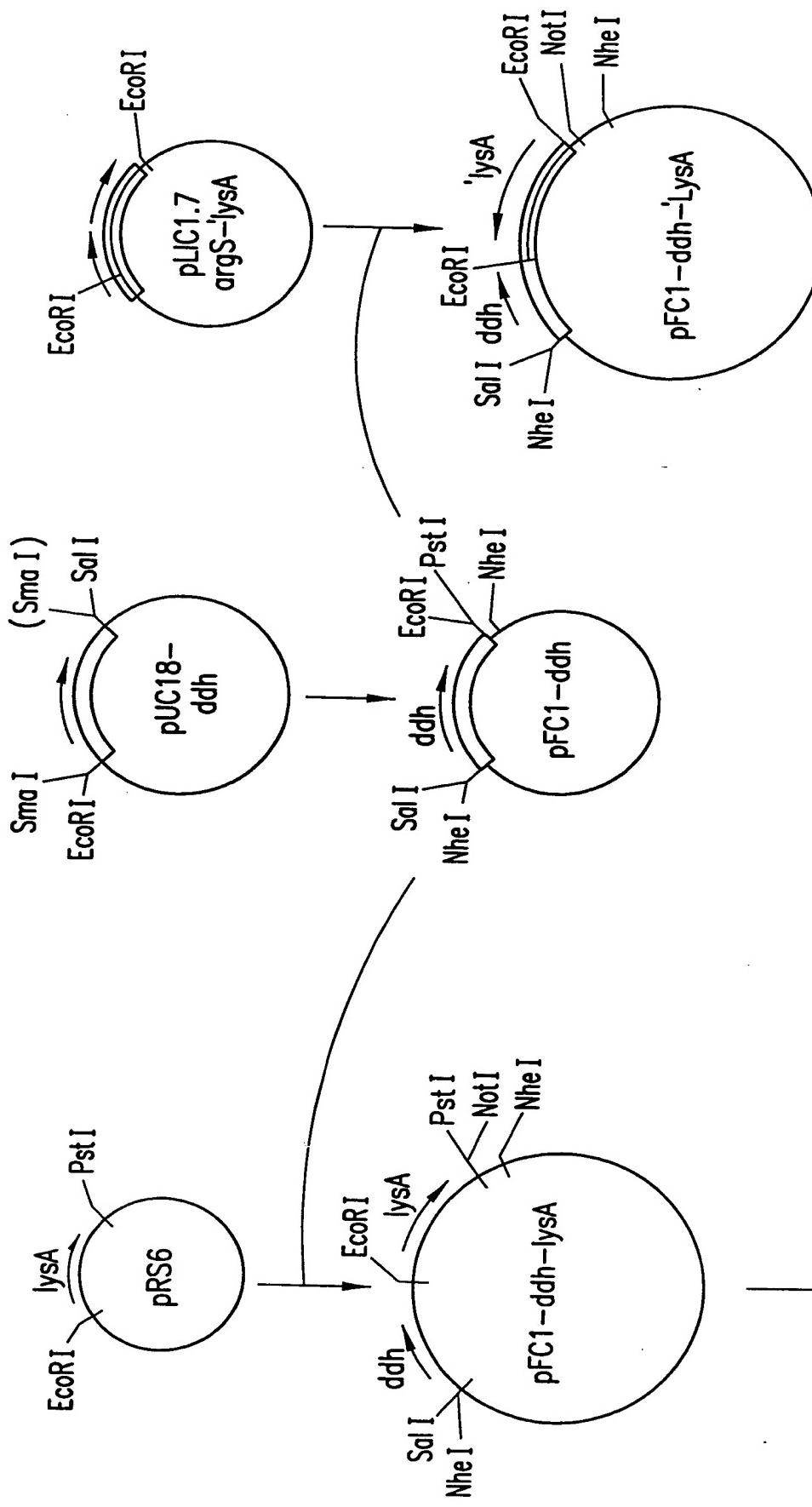
V A A P T V F G D F E I E T L A D G S Q

ATGGCAACAAGCCGTATGTATGGACTTTAA
 721 -----+-----+-----+--- 753

M A T S P Y V M D F *

FIG. 17B

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	



CONT. ON FIG.18B

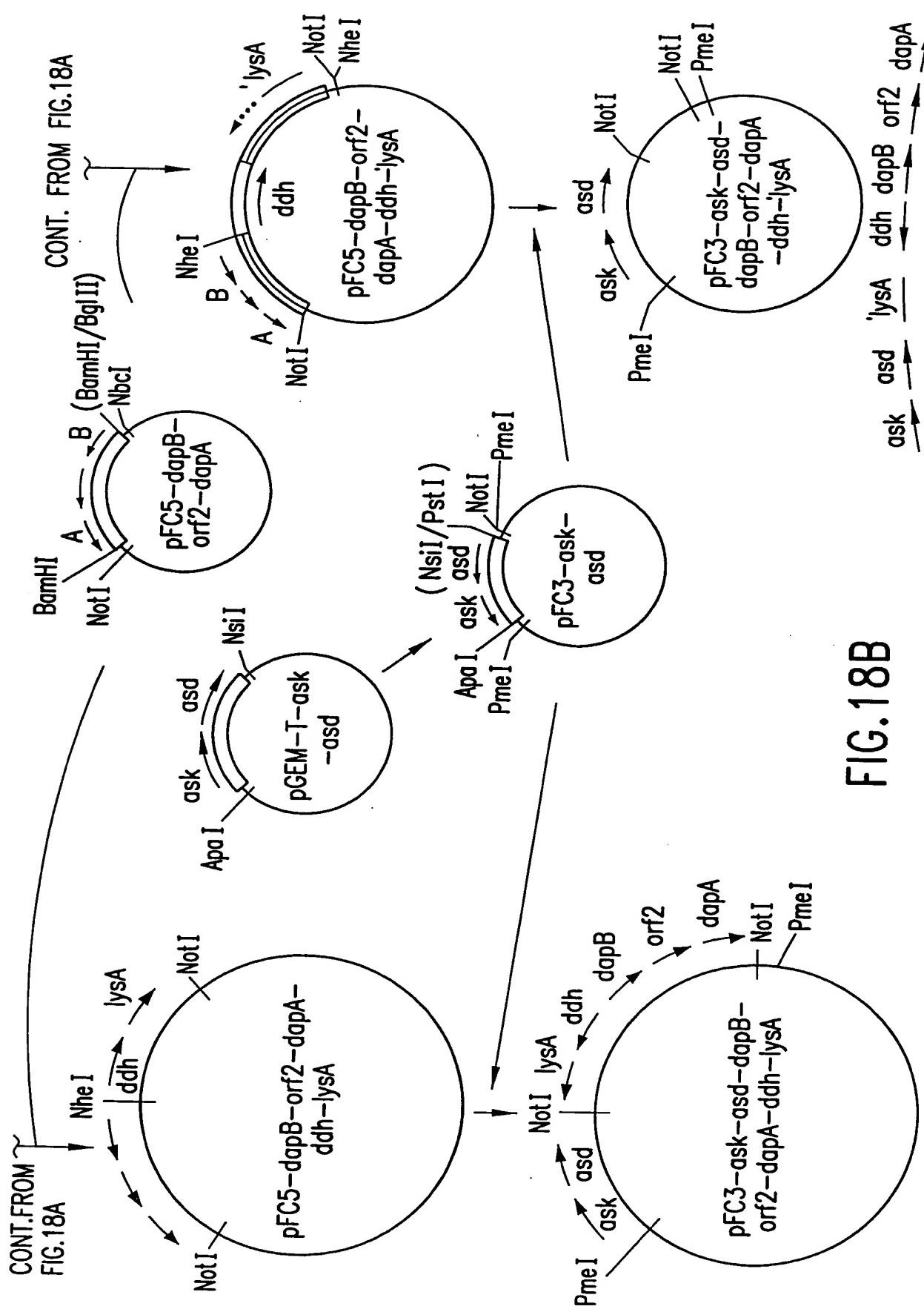
FIG. 18A

CONT. ON FIG.18B

APPROVED	O.G. FIG.
BY	CLASS SUBCLASS
DRAFTSMAN	

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Appl. No. 09/722,441; Group Art Unit: 1645
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 Title: Increased Lysine Production by Gene Amplification



APPROVED BY	O.G. FIG.
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 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

	1	50
ATCC 13032		V
N13		C
ATCC 21529		C
Consensus	MALVVQKYGG SSLESAERIR NVAERIVATK KAGNDVVVVC SAMGDTTDEL	
	51	100
ATCC 13032		
N13		
ATCC 21529		
Consensus	LELAAAVNPV PPAREMDMLL TAGERISNAL VAMAIESLGA EAQSFTGSQA	
	101	150
ATCC 13032		
N13		
ATCC 21529		
Consensus	GVLTTERHGN ARIVDVTPGR VREALDEGKI CIVAGFQGVN KETRDVTTLG	
	151	200
ATCC 13032		
N13		
ATCC 21529		
Consensus	RGGSDTTAVA LAAALNADVC EIYSDVDGVY TADPRIVPNA QKLEKLSFEE	
	201	250
ATCC 13032		
N13		
ATCC 21529		
Consensus	MLELA AVGSK ILVLR SVEYA RAFNVPLRVR SSYSNDPGTL IAGSMEDIPV	
	251	300
ATCC 13032		
N13		
ATCC 21529		
Consensus	EEAVLTGVAT DKSEAKVTVL GISDKPGEAA KVFRALADAЕ INIDMVLQNV	
	301	350
ATCC 13032	S	G
N13	A	D
ATCC 21529	A	G
Consensus	SSVEDGTTDI TFTCPRADGR RAMEILKKLQ VQGNWTNVLY DDQVGKVSLV	
	351	400
ATCC 13032	T	
N13	T	
ATCC 21529	I	
Consensus	GAGMKSHPGV TAEFMEALRD VNVNIELIST SEIRISVLIR EDDLDAARA	
	401	421
ATCC 13032		
N13		
ATCC 21529		
Consensus	LHEQFQLGGE DEAVVYAGTG R	

FIG. 19

APPROVED BY	O. G. FIG.
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Appl. No. 09/722,441; Group Art Unit: 1645
 Dkt. No. 1533.1030002; Batch No.: To Be Assigned
 Inventor(s): Hanke et al.; Tel: 202/371-2600
 Title: Increased Lysine Production by Gene Amplification

HpaI-PvuII fragment comprising the P1 promoter (SEQ ID NO:17)

AACCGGTGTGGAGCCGACCATTCCGCAGGGCTGCACTGCAACGAGGTCGTAGTTTGGTACATGGCTTCTG
 GCCAGTTCATGGATTGGCTGCCAAGAACGCTATAGGCATGCCACCAGGGCACCAGGAGTTACCGAAGATG
 GTGCCGTGCTTTGCCCTGGGCAGGGACCTTGACAAAGCCCACGCTGATATGCCAAGTGAGGGATCAGA
 ATAGTGCATGGGCACGTCGATGCTGCCACATTGAGCGGAGGAATATCTACCTGAGGTGGGCATTCTTCCC
 AGCGGATGTTTCTTGCCTGCTGCACTGGCATTGATACCAAAAAGGGCTAACGCAGTCGAGGCGCA
 AGAACTGCTACTACCTTTTATTGTCGAACGGGGCATTACGGCTCCAAGGACGTTGTTCTGGTCAG
 TTACCCCCAAAAGCATATACAGAGACCAATGATTTTCACTAAAAAGGCAGGGATTGTTATAAGTATGGG
 TCGTATTCTGTGCGACGGGTGTACCTCGGCTAGAATTCTCCCCATGACACCAAG

FIG. 20

APPROVED	O.G. FIG.
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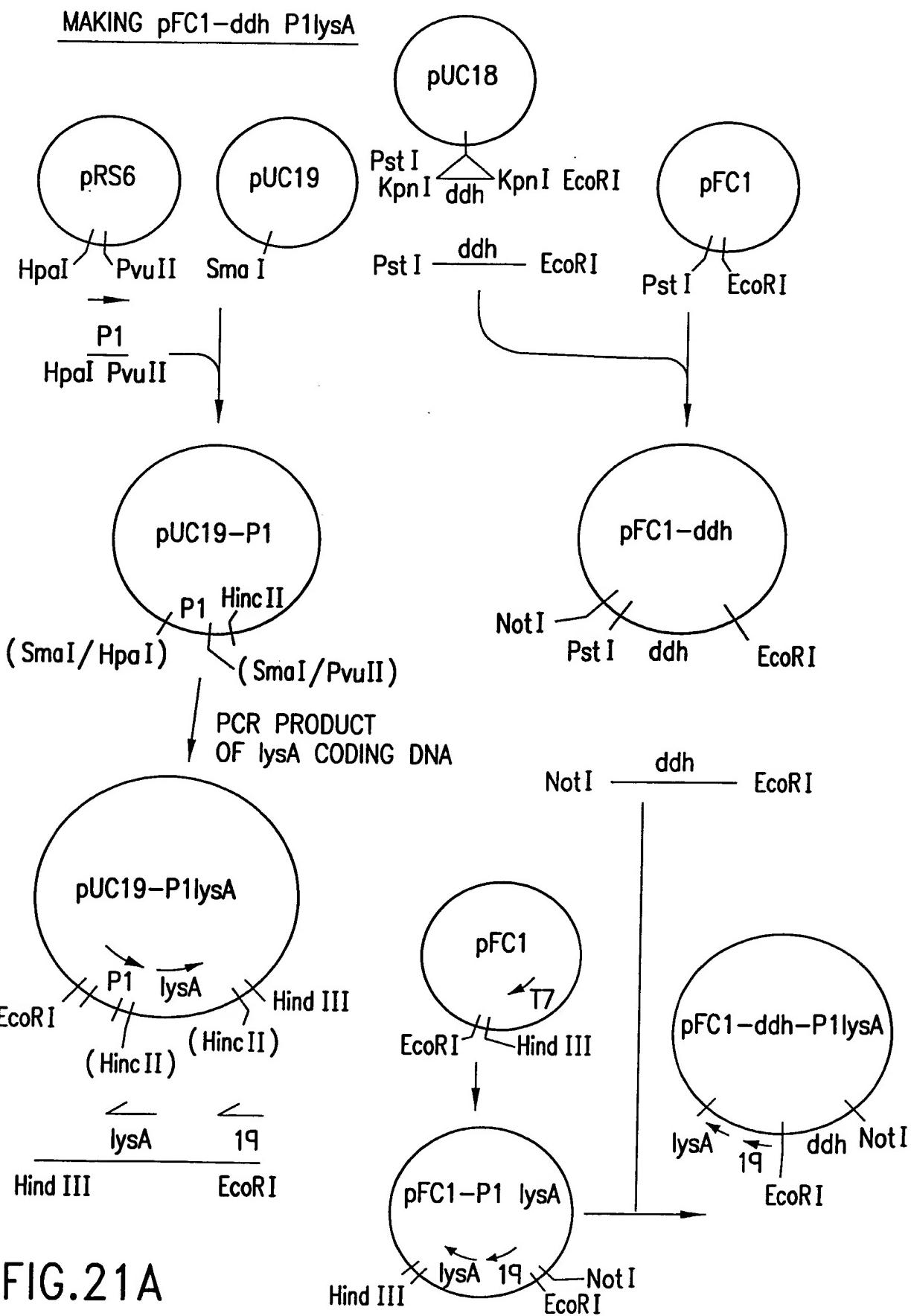


FIG.21A

APPROVED	O.G. FIG.
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MAKING pDElia2-KDABHP1L

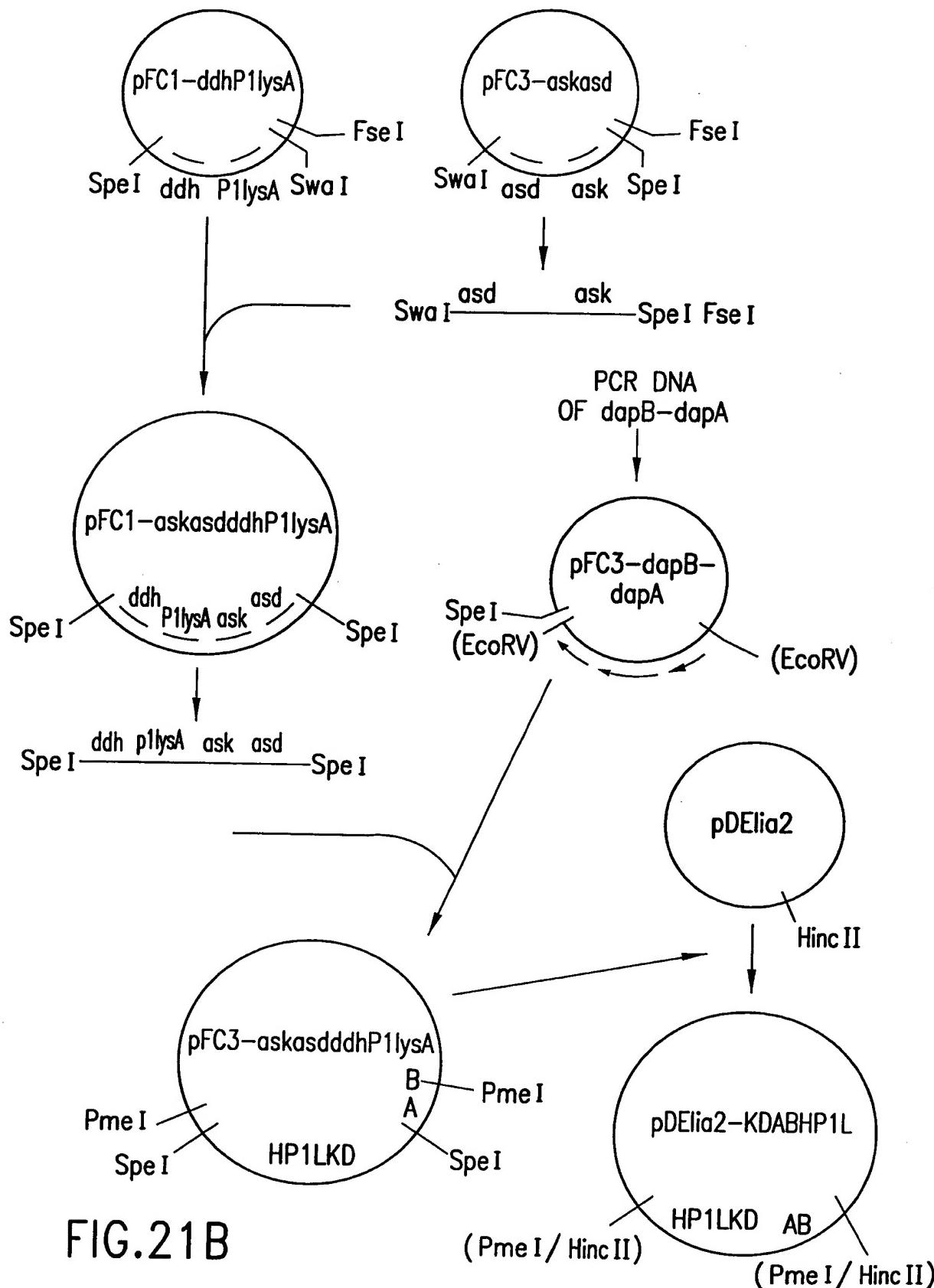


FIG.21B

MAKING pDElia2FC5-KDBHL

(FROM FIG.18A)

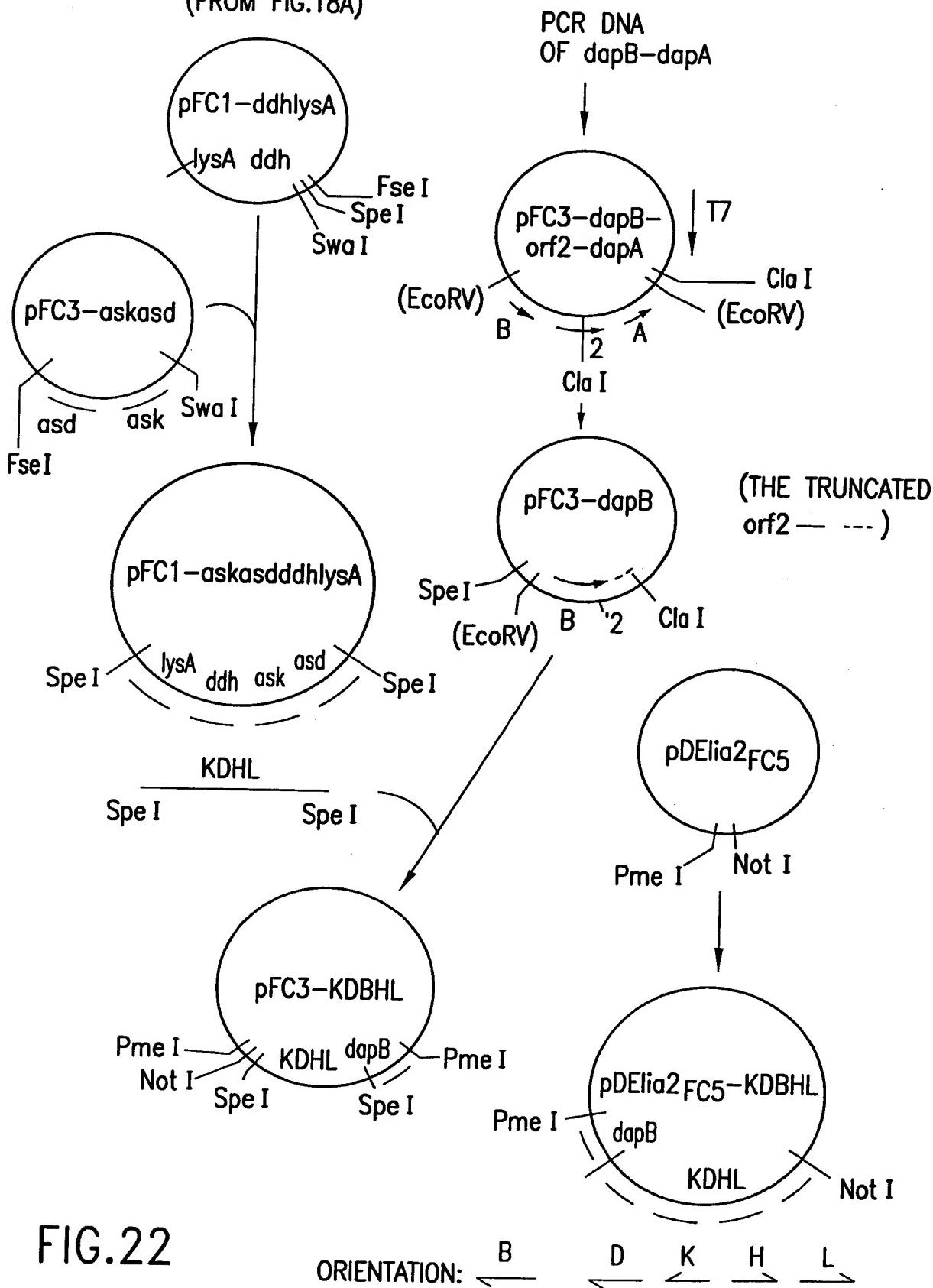


FIG.22

ORIENTATION: B → D → K → H → L

APPROVED	O. S. FIG.
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Nucleotide sequence of truncated ORF2 (SEQ ID NO:18)

1 GTGGCCGAAC AAGTTAAATT GAGCGTGGAG TTGATAGCGT GCAGTTCTTT
51 TACTCCACCC GCTGATGTTG AGTGGTCAAC TGATGTTGAG GGCGCGGAAG
101 CACTCGTCGA GTTTCGGGT CGTGCCTGCT ACGAAACTTT TGATAAGCCG
151 AACCCCTCGAA CTGCTTCCAA TGCTCGTAT CTGCGCCACA TCATGGAAGT
201 GGGGCACACT GCTTGCTTG AGCATGCCAA TGCCACGATG TATATCCGAG
251 GCATTTCTCG GTCCCGCGACC CATGAATTGG TCCGACACCG CCATTTTCC
301 TTCTCTCAAC TGTCTCAGCG TTTCGTGCAC AGCGGAGAAT CGGAAGTAGT
351 GGTGCCCACT CTCAT

FIG. 23

APPROVED	O.G. FIG.
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Truncated ORF2 amino acid sequence (SEQ ID NO:19)

GTGGCCGAACAAGTTAAATTGAGCGTGGAGTTGATAGCGTCAGTTCTTTACTCCACCC
 1 -----+-----+-----+-----+-----+-----+ 60

M A E Q V K L S V E L I A C S S F T P P

GCTGATGTTGAGTGGTCAACTGATGTTGAGGGCGCGGAAGCACTCGTCGAGTTGCGGGT
 61 -----+-----+-----+-----+-----+-----+ 120

A D V E W S T D V E G A E A L V E F A G

CGTGCCTGCTACGAAACTTTGATAAGCCGAACCCCTCGAACTGCTTCCAATGCTGCGTAT
 121 -----+-----+-----+-----+-----+-----+ 180

R A C Y E T F D K P N P R T A S N A A Y

CTGCGCACATCATGGAAGTGGGGCACACTGCTTGCTTGAGCATGCCAATGCCACGATG
 181 -----+-----+-----+-----+-----+-----+ 240

L R H I M E V G H T A L L E H A N A T M

TATATCCGAGGCATTTCTCGGTCCCGAACCCATGAATTGGTCCGACACCGCCATTTTCC
 241 -----+-----+-----+-----+-----+-----+ 300

Y I R G I S R S A T H E L V R H R H F S

TTCTCTCACTGTCTCAGCGTTCTGCACAGCGGAGAACCGAAGTAGTGGTGCCACT
 301 -----+-----+-----+-----+-----+-----+ 360

F S Q L S Q R F V H S G E S E V V V P T

CTCAT ...
 361 -----

L (I)

FIG. 24

APPROVED	D.G. FIG.
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Sequence of truncated LysA ('LysA) (NRRL-B11474) (SEQ ID NO:20)

ATGGCTACAGTTGAAAATTCAATGAACACTCCGCACACGTATGGCCACGCAATGCAGTG
CGCCAAGAACGGCGTTGTCACCGTCGCTGGTGTGCCTCTGCCCTGACCTCGCTGAAGAA
TACGGAACCCCACGTTCGTAGTCGACGAGGACGATTTCCGTTCCGCTGTCGCGACATG
GCTACCGCATTGGTGGACCAGGCAATGTGCACTACGCATCAAAGCGTTCCGACCAAG
ACCATTGCACGTTGGGTTGATGAAGAGGGCTGGCACTGGACATTGCGTCCATCAATGAA
CTGGGCATTGCCCTGGCCGCTGGTTCCGGCCAGCCGTATCACCGCGCACGGCAACAAC
AAAGGCGTAGAGTTCCCTGCGCGCGTTGGTCAAAACGGTGTGGCATGTGGTGTGGAC
TCCGCGCAGGAATTGGAACTGCTGGATTACGTTGCCGCTGGTGAAGGCAAGATCCAGGAC
GTGTTGATCCGCGTGAAGCCAGGTATCGAAGCCCACACCCACGAGTTCATGCCACTAGC
CACGAAGACCAGAACGTTGGATTCCCTGGCATCCGGTCCGATTGAAGCAGCGAAA
GCAGCCAACAATGCAGAGAACCTGAACCTGGTTGGTCTGCACTGCCATGTTGGTCCAG
GTGTTGACGCCGAAGGCTCAAGCTGGCAGCAGAGCGCGTGTGGGGCCTGTACTCACAG
ATCCACAGCGAACTAGGTGTCGCCCTCCTGAGCTGGACCTCGGTGGCGGATACGGCATC
GCCTACACTGCAGATGAGGAACCACTCAACGTCGCAGAAGTCGCCCTCGACCT

FIG. 25

APPROVED	C.G. FIG.
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Title: Increased Lysine Production by Gene Amplificatio

Truncated sequence of LysA (NRRL-B11474)

DIAMINOPIMELATE DECARBOXYLASE (LysA) (SEQ ID NO:21)

MATVENFNELPAHVWPRNAVRQEDGVVTAGVPLPDLAEEYGTPLFVVDEDDFRSRCRDM
ATAFGGPGNVHYASKAFLTKTIARWVDEEGLALDIASINELGIALAAGFPASRITAHGNN
KGVEFLRALVQNGVGHVVLDQAQELELLDYVAAGEGKIQDVLIRVKPGIEAHTHEFIATS
HEDQKFGFSLASGSAFEAAKAANNAENLNLVGLHCHVGSQVFDAEGFKLAAERVLGLYSQ
IHSELGVALPELDLGGGYGIAYTADEEPLNVAEVASDL

FIG. 26